ABSTRACT

A method of reducing an amount of carbon monoxide in process fuel gas in a water gas shift converter with no methane formation. The method includes placing a high activity water gas shift catalyst system into a water gas shift converter; and passing the process fuel gas through the water gas shift converter in effective contact with the high activity water gas shift catalyst system and converting a portion of the carbon monoxide in the process fuel gas into carbon dioxide and hydrogen by a water gas shift reaction with no methane formation at a temperature in a range of about 200°C to about 425°C. The high activity water gas shift catalyst system can include a noble metal; a support consisting essentially of cerium oxide, or a mixed metal oxide of cerium oxide-zirconium oxide or cerium oxide-lanthanum oxide wherein cerium oxide is present in an amount ranging from about 80% to about 20% by weight of total metal oxide and wherein zirconium oxide or lanthanum oxide is present in an amount ranging from about 20% to about 80% by weight of total metal oxide; an anti-methanation agent comprising at least one compound selected from copper compounds, manganese compounds, iron compounds, or combinations thereof; and optionally a promoter comprising at least one metal selected from alkali metals and alkaline earth metals. Alternatively, the high activity water gas shift catalyst system can include a support consisting essentially of a mixed metal oxide of cerium oxide-copper oxide or zirconium oxide-copper oxide wherein cerium oxide or zirconium oxide is present in an amount ranging from about 80% to about 50% by weight of mixed metal oxide, and wherein copper oxide is present in an amount ranging from about 20% to about 50% by weight of mixed metal oxide;

optionally a noble metal; and optionally a promoter comprising at least one metal selected from alkali metals and alkaline earth metals.